

REMARKS

Favorable reconsideration is respectfully requested.

The claims are 12-24.

The above amendment is responsive to points set forth in the Official Action.

With regard to the rejections under 35 U.S.C. 112, the present claims no longer recited the rejected terminology.

In this regard, new claim 13, which replaces claim 2, the term "such as" no longer appears.

In claim 14, which replaces claim 3, the term "pre-" no longer appears.

Antecedent basis is provided in new claim 16, which replaces previous claim 4.

Antecedent basis is also provided in new claims 20-24, which replace previous claims 5 and 9-11.

New claim 18, which replaces previous claim 6, is complete.

In new claim 17, which replaces previous claim 7, the term "used as" no longer appears.

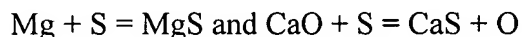
There is no longer a counterpart to previous claim 8.

Thus, the present claims are free from the rejections under 35 U.S.C. 112.

Claims 1 to 7 and 9 to 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Rossborough (U.S. 5,358,550). Rossborough is said to disclose a method comprising injecting calcium nitrate (column 2, line 34) and a liquid gas producing compound (column 3, lines 28-30) in combination with magnesium (column 4, lines 28) and a carrier gas such as nitrogen (column 9, lines 31) which is said to anticipate the claimed method.

This rejection is respectfully traversed.

Rossborough concerns desulphurization of pig iron with Mg, a "calcium compound" and a gas producing liquid compound are added. Sulphur is removed by the reactions



Conditions must be reducing for these reactions to take place. As correctly stated in the patent conditions must not be oxidizing.

Thus, the patent concerns sulphur removal under reducing conditions. The use of calcium nitrate would be highly undesirable since calcium nitrate is oxidizing and would prevent the

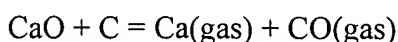
removal of S. Calcium nitrate is not mentioned in the claims. The function of the Mg is to react with S (and not to reduce SiO₂ as in the claim at issue). The function of the gas producing liquid compound is to enhance the rate of the above reactions and not to increase the volume of slag.

Accordingly, the rejection on Rossborough is untenable.

Claims 1 to 7 and 9 to 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwer (U.S. 4,447,265) in view of Rossborough (U.S. 5,358,550).

This rejection is also respectfully traversed.

In Schwer, a carbon source is added and an “oxide of calcium” or dolomite (CaO and MgO). It is claimed that this will result in foaming. However, to achieve foaming, a gas phase must be produced first. An oxide of calcium does not give any gas, but rather melts and ionizes in the slag. To produce a gas, the following type of reaction must take place:



For the pressure of Ca(gas) + CO(gas) to become 1 bar (1 atmosphere), the temperature must be higher than 2000 degrees Centigrade. If the lime dissolves in the slag, even higher temperatures are required. A similar problem is encountered with MgO.

In Schwer, an oxygen source (FeO) is included, but restricted to 5% of the addition. This will give very little foaming gas. Schwer seems to give very little gas production and resultant foaming of slag.

Foaming of slag has previously been accomplished in a two-stage process by oxidizing metal, allowing oxide to enter the slag phase and adding carbon to react with oxide in the slag phase to give CO gas. This CO gas can (for favorable wetting conditions and slag composition) allow foaming of the slag.

In the present patent application, calcium nitrate is added as an oxygen (and nitrogen) source. Carbon is already present or added together with calcium nitrate. This results in direct gas production, in contrast to Schwer. Calcium nitrate and carbon react to form CO gas, which is required in order to have foaming. Previously calcium nitrate had not been used as a source of oxygen and nitrogen to give foaming of steel-making slag.

Conditions will be oxidizing and different from what is required to remove sulphur from steel (as in Rossborough). Therefore, it would not be obvious for a person skilled in the art to

combine information from the Rossborough and Schwer patents, as they deal with processes under different conditions. If calcium nitrate were added as a calcium source in Schwer, the whole reaction mechanism would be very different than what is described in the disclosure. If Mg is added according to the invention, it is to reduce some component in the slag (Cr_2O_3) that hinders foaming and not to remove sulphur.

For the foregoing reasons, it is apparent that the rejections on prior art are untenable and should be withdrawn.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

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